

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) TACHOMETER

(71) We, UNITED AIRCRAFT CORPORATION, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 400 Main Street, East Hartford, Connecticut, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to tachometers. The tachometer described is especially suitable for use in association with jet engines.

The invention comprises a rotary machine having at least one conductive non-magnetic member located at a point not on the axis of said machine, said machine comprising a tachometer for producing a signal representing the speed of said machine including a magnetic circuit having an air gap located in such a way that said member passes through said air gap during operation of the machine, means for producing a static magnetic flux in said circuit and means responsive to reduction in said flux produced by eddy currents generated in said member as it passes through said air gap for producing said signal.

Preferred features and advantages of the invention will become apparent from the following description of an embodiment thereof, given by way of example, in conjunction with the accompanying drawings in which:

FIGURE 1 is a schematic view of a tachometer, according to an embodiment of the invention.

FIGURE 2 is a diagram illustrating the output produced by the tachometer.

Referring now to the Figure 1, the tachometer indicated generally by the reference character 10 is illustrated in use in connection with the compressor section of an aircraft jet engine. Only fragments of a few of the compressor blades 12 are shown, it being understood that the compressor actually has a multiplicity of such blades 12. A shroud 14

surrounds the blades 12. The shroud 14 is provided with an opening 16 in which is mounted a housing 18 formed of magnetic material. Bolts or screws 20 attach a flange 22 on housing 18 to the shroud 14.

The tachometer 10 includes a core 24, formed of magnetic material, which is secured to the closed end 26 of housing 18 by any suitable means such as by welding. The end of core 24 remote from the closed housing end 26 carries a permanent magnet 28 disposed adjacent the open end 30 of the housing 18. In the structure just described, it will be seen that there is provided a magnetic circuit including the wall of the housing 18, the core 24, the permanent magnet 28 and the relatively large air gap between the permanent magnet 28 and the open end 30 of the housing. The flux Φ generated by magnet 28 is illustrated by broken lines in FIGURE 1.

The blades 12 are formed of conductive, non-magnetic material. As the blades 12 move through the flux Φ in the air gap of the device, eddy currents are generated in the blades. These eddy currents in turn produce flux which opposes the flux which caused the eddy currents. Owing to the arrangement of the air gap and the consequent flux path, as a blade passes through the air gap, the flux in the magnetic circuit passes through a complete cycle of variations.

A coil 32 is mounted on the core 24. Coil 32 is so wound that the axis thereof is coaxial with core 24. As the flux in the magnetic circuit passes through a cycle of variations, lines of force cut the turns of the coil 32 to cause a voltage to be induced therein. The voltage induced in the coil 32 in response to the passage of successive blades 12 through the air gap flux is illustrated in FIGURE 2. It will be seen that as each blade passes through the gap the voltage induced in the coil goes through one cycle of variation. Moreover, the distance between corresponding points in two successive cycles of variation is a measure of

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